January 22, 2004

Mr. Mark Peifer
Site Vice-President
Duane Arnold Energy Center
Nuclear Management Company, LLC
3277 DAEC Road
Palo, IA 52324

SUBJECT: DUANE ARNOLD ENERGY CENTER
NRC INTEGRATED INSPECTION REPORT 5000331/2003006

Dear Mr. Peifer:

On December 31, 2003, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Duane Arnold Energy Center. The enclosed integrated inspection report documents the inspection findings which were discussed on January 6, 2003 with Mr. J. Bjorseth and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and to compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based upon the results of this inspection, there was one self-revealing finding of very low safety significance, which involved a violation of NRC requirements. However, because this violation was of very low safety significance and because the issue was entered into the licensee's corrective action program, the NRC is treating this finding as a Non-Cited Violation in accordance with Section VI.A.1 of the NRC's Enforcement Policy. Additionally, a licensee-identified violation is listed in Section 4OA7 of this report.

If you contest the subject or severity of a Non-Cited Violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 801 Warrenville Road, Lisle, Il 60532-4351; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Duane Arnold Energy Center.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Bruce L. Burgess, Chief
Branch 2
Division of Reactor Projects

Docket No. 50-331
License No. DPR-49

Enclosure: Inspection Report 5000331/2003006
(w/Attachment: Supplemental Information)

cc w/encl: E. Protsch, Executive Vice President -
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President, IES Utilities, Inc.
J. Cowan, Executive Vice President and Chief Nuclear Officer
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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

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|---|---|
| Docket No: | 50-331 |
| License No: | DPR-49 |
| Report No: | 50000331/2003006 |
| Licensee: | Alliant, IES Utilities Inc. |
| Facility: | Duane Arnold Energy Center |
| Location: | 3277 DAEC Road<br>Palo, Iowa 52324-9785 |
| Dates: | October 1, 2003 through December 31, 2003 |
| Inspectors: | G. Wilson, Senior Resident Inspector<br>S. Caudill, Resident Inspector<br>R. Schmitt, Reactor Health Physics Inspector<br>M. Holmberg, Senior. Reactor Inspection<br>T. Ploski, Division of Reactor Safety<br>H. Peterson, Division of Reactor Safety |
| Observers: | Magdalena Dziedzic |
| Approved by: | Bruce L. Burgess, Chief<br>Branch 2<br>Division of Reactor Projects |

Enclosure

## SUMMARY OF FINDINGS

IR 05000331/2003006, IES Utilities, Inc.; on 10/01/2003-12/31/2003, Duane Arnold Energy Center; Operability Evaluations.

This report covers a 3-month period of baseline resident inspection and announced baseline inspections on emergency preparedness and heat sink performance. The inspections were conducted by Region III inspectors and the resident inspectors. This inspection identified one Green finding that involved a Non-Cited Violation (NCV). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be "Green" or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### A. Inspector-Identified and Self-Revealed Findings

**Cornerstone: Mitigating Systems**

1. Green. A finding of very low safety significance was identified through a self-revealing event, during the operation of the "A" RHRSW/ESW Pump Room ventilation system. The primary cause of this finding was related to the cross-cutting area of human performance for the failure to follow maintenance procedures during the installation of a temperature controller TC7539A. Once identified, the licensee correctly installed the temperature controller to reestablish proper ventilation control in the A" RHRSW/ESW Pump Room.

   The finding was more than minor, since the temperature controller was returned to service in an inoperable condition. In addition, if left uncorrected, this issue could have became a more significant safety concern in that, with high outside ambient air temperatures, the 'A' RHRSW/ESW Pump Room temperature could have increased to the point that all three pumps would fail. This finding was determined to be of very low safety significance, since the temperature in the "A" RHRSW/ESW Pump Room would not have exceeded the 180° Fahrenheit operating temperature limit for the pumps during the time frame of May 5 through June 25, 2003. An NCV of 10 CFR 50, Appendix B, Criterion V, was identified for the failure to follow maintenance procedures during the installation of the temperature controller. (Section 1R15)

### B. Licensee-Identified Violations

A violation of very low safety significance, which was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective action tracking numbers are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Duane Arnold Energy Center operated at or near full power for the entire assessment period except for brief down-powers to accomplish rod pattern adjustments and conduct planned surveillance testing activities with the following exceptions:

- On November 2, 2003, plant staff observed a significant spike in condenser hotwell conductivity and shut down the plant. The hotwell conductivity spike was due to a condenser tube leak, which had been intermittently causing smaller conductivity spikes since mid-September. On November 6, 2003 the plant was back online after repairing the tube leak.

- On November 7, 2003 plant staff noticed a spike in reactor vessel coolant conductivity, and manually scrammed the plant. The licensee's preliminary investigation did not identify the source of the reactor vessel coolant conductivity spike. On November 9, 2003 the plant was re-started. Shortly after the generator was placed online, plant staff observed higher than normal air in-leakage to the condenser. This limited the plant operation to about 27 percent capacity. Plant staff performed helium leak testing and determined that the condenser boot was the likely source of the air in-leakage and also determined that the reactor vessel conductivity spike was due to problems with the 'E' condensate filter/demineralizer, which had new filter septa installed in late October.

- On November 18, 2003 the plant was shut down in order to repair both the high and low pressure condenser boots. Visual examination of the boots found several small nicks and gouges, but no significant degradation. On November 25, 2003 the plant was restarted after the boot and 'E' condensate filter/demineralizer repairs. About four hours later the plant was manually scrammed due to a sudden decrease in condenser vacuum. Extensive troubleshooting determined that the cause was a faulty weld at the top of the inter-condenser water seal, on the high pressure condenser side. On December 5, 2003, after the condenser weld repairs were completed, the plant went back online. The plant operated at full power with no further in-leakage or chemistry-related problems for the remainder of the assessment period.

- On December 31, 2003 power was reduced to 50 percent capacity, due to a problem with water intrusion into the 'B' reactor feed pump oil system. This was discovered during a routine quarterly oil sampling activity. The most probable source of the water was thought to be general service water due to the high level of calcium in the water. As of the end of the inspection period, the licensee was planning to replace the 'B' reactor feed pump's lubricating oil heat exchanger in order to correct the problem.

## 1. REACTOR SAFETY

### Cornerstone: Initiating Events, Mitigating Systems, Barrier Integrity and Emergency Preparedness

1R01 Adverse Weather Protection (71111.01)

.1 Cold Weather

a. Inspection Scope

During the week of November 15, 2003, the inspectors conducted a review of the licensee's preparations for cold weather for a total of one sample to verify that the plant's design features and implementation of procedures were sufficient to protect mitigating systems from the effects of adverse weather. As part of this inspection, the documents in the Attachment were also reviewed. In addition, documentation for selected risk-significant systems was reviewed to ensure that these systems would remain functional when challenged by inclement weather. In particular, the inspectors focused on the Condensate Storage Tank (CST), Control Building Heating Ventilation and Air Conditioning (HVAC) System, Pump House HVAC System, and Reactor Building HVAC System. For these areas, the inspectors reviewed Integrated Plant Operating Instruction (IPOI) 6, "Cold Weather Operations," Revision 22 and walked down portions of the systems listed above and verified that they had been properly aligned for cold weather operation.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdowns

a. Inspection Scope

The inspectors performed three partial walkdowns of accessible portions of trains of risk-significant mitigating systems equipment. As part of this inspection, the documents in the Attachment were used to evaluate the potential for an inspection finding. The inspectors reviewed equipment alignment to identify any discrepancies that could impact the function of the system and potentially increase risk. Identified equipment alignment problems were verified by the inspectors to be properly resolved. Redundant or backup systems were selected by the inspectors during times when the trains were of increased importance due to the redundant trains of other related equipment being unavailable. Inspection activities included, but were not limited to, a review of the licensee's procedures, verification of equipment alignment, and an observation of material condition, including operating parameters of equipment in-service.

The inspectors selected the following equipment trains to verify operability and proper equipment line-up for a total of three samples:

- 'B' Core Spray System during the week of October 4, 2003;
- 'A' River Water System during the week of October 25, 2003: and
- 'B' Control Building Chiller System during the week of November 1, 2003.

b. Findings

No findings of significance were identified.

1R05 **Fire Protection (71111.05)**

.1 Quarterly Fire Zone Inspections

a. Inspection Scope

The inspectors walked down nine risk significant fire areas to assess fire protection requirements. As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding. The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and had implemented adequate compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems or features. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events, the potential to impact equipment which could initiate or mitigate a plant transient, or the impact on the plant's ability to respond to a security event. The inspection activities included, but were not limited to, the control of transient combustibles and ignition sources, fire detection equipment, manual suppression capabilities, passive suppression capabilities, automatic suppression capabilities, compensatory measures, and barriers to fire propagation.

During the week of October 11, 2003 the following Area Fire Plans (AFP) were inspected for a total of nine samples:

- AFP-3; HPCI, RCIC & Radwaste Tank Rooms;
- AFP-6; RHR Valve Room; and
- AFP-10; Reactor Building Main Exhaust Fan Room;
- AFP-11; Reactor Building Laydown Area;
- AFP-12; Decay Tank and Condensate Phase Separator Rooms.
- AFP-23; Control Building Battery Rooms;
- AFP-24; Control Building Essential Switchgear Rooms;
- AFP-74; Switchyard;
- AFP-79; Spent Fuel Storage Facility;

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07)

.1 Biennial Review of Heat Sink Performance

a. Inspection Scope

In response to NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," the licensee committed to develop a continuing program for monitoring heat exchanger performance (reference licensee letter dated October 9, 1990). In this letter, the licensee indicated that this program would include maintenance and test activities that would ensure satisfactory performance of safety-related heat exchangers.

From November 18, 2003, through November 21, 2003, in an on-site office in the plant support center, the inspectors reviewed licensee records associated with inspection, cleaning, and performance trending of the B residual heat removal (RHR) heat exchanger and the B emergency diesel generator jacket water cooling heat exchanger. The inspectors selected these heat exchangers based upon their importance in supporting required safety functions and relatively high risk achievement worths. Specifically, the inspectors reviewed the licensee's heat transfer related calculations and maintenance activities to confirm that the minimum design heat transfer capability was maintained for these heat exchangers, in accordance with licensee commitments.

The inspectors concluded that the documents reviewed for these activities, together with documents reviewed under Section 4OA2.1 of this report, constituted two samples for the biennial review of heat sink performance in accordance with Section 71111.07-05 of procedure 71111.07, "Heat Sink Performance."

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Annual Operating Test Results

a. Inspection Scope

The inspectors reviewed the overall pass/fail results of Job Performance Measure (JPM) operating tests and simulator operating tests (required to be given per 10 CFR 55.59(a)(2)) administered by the licensee during calendar year 2003. The licensee completed the annual operating examination on December 16, 2003. The overall results were compared with the significance determination process in accordance with NRC Manual Chapter 0609I, "Operator Requalification Human Performance Significance Determination Process (SDP)."

b. Findings

No findings of significance were identified.

.2 Routine Requalification Program Observation

a. Inspection Scope

On October 21, 2003, the inspectors observed a training crew during an evaluated simulator scenario, Evaluated Scenario Guide (ESG) 71, for a total of one sample. The scenario included a safety relief valve (SRV) bellows failure, loss of annunciators, and an Anticipated Transient without a SCRAM (ATWS). Licensed operators' performances in mitigating the consequences of events were reviewed by the inspectors.

The inspectors evaluated crew performance in the areas of:

- clarity and formality of communications;
- timeliness of actions, prioritization of activities;
- procedural adequacy and implementation;
- control board manipulations;
- managerial oversight, emergency plan execution; and
- group dynamics.

The crew performance was compared to licensee management expectations and guidelines as presented in the following documents:

- Administrative Control Procedure (ACP) 110.1, "Conduct of Operations," Revision 0;
- ACP 101.01, "Procedure Use and Adherence," Revision 0; and
- ACP 101.2, "Verification Process and SELF/PEER Checking Practices," Revision 5.

The inspectors assessed whether the crew completed the critical tasks listed in the above guidelines. The inspectors also compared simulator configurations with actual control board configurations. For any weaknesses identified, the inspectors verified that licensee evaluators also noted the same issues and discussed them during the end of session critique. As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed the licensee's evaluation of plant risk, scheduling, and configuration control. The inspectors also evaluated the performance of maintenance

associated with planned and emergent work activities to determine if they were adequately managed. In particular, the inspectors reviewed the licensee's program for conducting maintenance risk safety assessments and to ensure that the licensee's planning, assessment and management of online risk was adequate. As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding. The inspectors also reviewed that licensee actions to address increased online risk during these periods, such as establishing compensatory actions, minimizing the duration of the activity, obtaining appropriate management approval, and informing appropriate plant staff, were accomplished when online risk was increased due to maintenance on risk-significant structures, systems, and components (SSCs).

The following activities were reviewed:

- The inspectors reviewed the maintenance risk assessment for work planned during the week of October 4, and October 18, 2003, for a total of two samples.

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Non-Routine Plant Evolutions and Events (71111.14)

.1 Annual Evaluation of Licensee Event Reports (LERs)

a. Inspection Scope

The inspectors reviewed all LERs written during the 2003 calender year, focusing on those involving personnel response to non-routine conditions for a total of one sample. Where applicable, the inspectors evaluated whether or not licensee personnel responded in accordance with applicable procedures and training. As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors assessed the following operability evaluations for a total of five samples:

- Operability (OPR) 000246; Station Batteries 1D1, 1D2, 1D4, and 1D93; during the week of October 18, 2003;
- CAP027969; Emergency Service Water (ESW) room cooler inlet damper failed closed during the week of October 25, 2003;
- OPR000247; KAMAN 1 & 2; during the week of November 1, 2003;

- CAP029311; Pump House HVAC Design Issues; during the week of November 8, 2003; and
- CAP029587; Reactor Vessel Wide Range Transmitter Cable Routing Violates Divisional Separation; during the week of December 6, 2003.

The inspectors reviewed the technical adequacy of the evaluation against the Technical Specification, UFSAR, and other design information; determined whether compensatory measures, if needed, were taken; and determined whether the evaluations were consistent with the requirements of the licensees ACP-114.5, "Action Request System;" Rev. 32. As part of this inspection, the documents in the Attachment were used to evaluate the potential for an inspection finding.

b. Findings

Introduction

A finding of very low safety significance (Green) and an associated NCV of 10 CFR 50, Appendix B, Criterion V, related to the incorrect installation of the 'A' Residual Heat Removal Service Water (RHRSW)/ESW Pump Room ventilation supply damper temperature controller, was identified through a self-revealing event.

Description

From May 5, 2003 to June 25, 2003, the 'A' RHRSW/ESW Pump Room ventilation supply Damper Operator (DO) 7539A was failed closed, due to a maintenance error on May 5, 2003 in which the temperature controller (TC) 7539A for the damper was incorrectly installed. The failure to follow procedures outlined in preventive work order (PWO) 1123791 for the installation of TC7539A was determined to be caused, in part, by a human performance deficiency. Other factors are discussed in section 40A7 of this report. On May 5, 2003, during the installation of TC7539A, the temperature transmitter (TT) 7539A signal was connected to the "I" port of TC7539A, instead of the "II" port which is required per drawing M073-052 and the vendor manual. When the signal from TT7539A is connected to the "II" port, it allows TC7539A to modulate DO7539A. Since the signal from TT7539A was connected to port "I," it caused TC7539A to fail DO7539A closed. With this damper closed, the HVAC system for the 'A' RHRSW/ESW Pump Room was unable to control room temperature. This could have allowed the 'A' RHRSW/ESW Pump Room temperature to increase to above 180° Fahrenheit (F), thereby affecting pump operation. This is due to the fact that the ESW pump motor bearing is air-cooled, and it was predicted that above 180° F there would be a loss of the bearing elastohydrodynamic lubrication, and the ESW pump motor angular contact ball bearing would fail. With the ESW pump out of service, the RHRSW pumps' motor upper thrust roller bearings would lose their cooling and fail also, thus rendering all three service water pumps unable to perform their associated function. The function of RHRSW is the removal of decay heat and the function of ESW is to cool the emergency systems components.

The inspectors observed a special test conducted by the licensee, on November 12, 2003, to test various HVAC flow scenarios in order to obtain data to perform an analysis to evaluate the worst case temperature scenario in the Pump Room. The analysis

revealed that on the hottest day of the time period in which the Pump Room HVAC was unable to control room temperature, with both 'A' RHRSW pumps and the 'A' ESW pump running, the maximum temperature would have reached approximately 146° F. This was below the 180° F temperature maximum operating limit for these pumps. The inspectors determined that although the licensee incorrectly installed TC7539A, the temperature in the "A" RHRSW/ESW Pump Room would not have exceeded the 180° F temperature operating limit for the pumps during the period of May 5, through June 25, 2003; therefore, this finding was determined to be of very low safety significance.

Analysis

The inspectors determined that a performance deficiency existed, because maintenance personnel, who installed the controller on May 5, 2003, did not follow the procedure to ensure the correct installation. Since there was a performance deficiency, the inspectors reviewed this issue against the guidance contained in Appendix B, "Issue Dispositioning Screening," of Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports."

The inspectors concluded that the issue was more than minor since the finding matched example 5.b. in Appendix E of Inspection Manual Chapter 0612, "Examples of Minor Issues." The "A" RHRSW/ESW room ventilation system was returned to service in a configuration that would have caused the room air damper to remain closed, adversely impacting the ability to cool train "A" RHRSW and ESW pumps. In addition, this issue would become a more significant safety concern, if left uncorrected, based on the potential for the loss of the "A" RHRSW and ESW pumps due to the room overheating. Ultimately, leaving TC7539A in its installed configuration, with high outside ambient air temperatures, could result in the loss of a train of both decay heat removal and emergency systems cooling, adversely impacting the ability to use these systems as alternate reactor injection sources during an emergency.

The inspectors reviewed this finding in accordance with Inspection Manual Chapter 0609, "Significance Determination Process (SDP)," Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." The inspectors determined that the finding affected the Mitigating Systems Cornerstone, however, the failure to adequately install TC7539A was a human performance deficiency confirmed not to not result in a loss of function per Generic Letter 91-18. This conclusion was based on a analysis that determined that ambient outside air temperatures remained below that needed to cause failure of the RHRSW/ESW pumps. Therefore, this issue was screened as Green.

Enforcement

10 CFR 50, Appendix B, Criterion V, requires that activities affecting quality shall be prescribed by documented instructions, procedures or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures or drawings. The pertinent requirements of Appendix B apply to all activities affecting safety-related component operation.

Contrary to the above, the licensee failed to follow the applicable instructions in PWO 1123791, to correctly install TC7539A. The failure to follow procedures to correctly install TC7539A resulted in DO7539A being in the failed close position, from May 5 through June 25, 2003, thereby affecting ventilation flow inside the "A" RHRSW/ESW Pump Room. Without proper ventilation flow inside the "A" RHRSW/ESW Pump Room, room temperature will rise, potentially rendering the "A" train of RHRSW and ESW, which are Appendix B systems, unavailable. The failure to follow the instructions in PWO 1123791 was an example where the requirements of 10 CFR 50, Appendix B, Criterion V, were not met and was a violation.
However, because of its low safety significance and because it was entered into the corrective action program as CAP027974, the NRC is treating this issue as a Non-Cited Violation (NCV 5000331/2003006-01), in accordance with Section VI.A.1 of the NRC's Enforcement Policy.

Corrective actions taken included reinstallation of the controller and ensuring that the reinstallation was accomplished correctly. Coaching was performed with the involved personnel on peer and self-checking, and on the need for attention to detail. An extent of condition review was performed to verify the correct installation of similar controllers. In addition, a procedure was developed to require a lifted mechanical connection verification form for use when flexible pneumatic tubing is disconnected and reconnected.

1R16 Operator Workarounds (OWA) (71111.16)

a. Inspection Scope

The inspectors performed a semiannual review of the cumulative effects of operator workarounds, during the week of November 1, 2003, for a total of one sample. As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding. The inspectors reviewed operator workarounds to identify any potential effect on the functionality of mitigating systems. The inspection activities included, but were not limited to, a review of the cumulative effects of the operator workarounds on the availability and the potential for improper operation of the system, for potential impacts on multiple systems, and on the ability of operators to respond to plant transients or accidents. Additionally, reviews were conducted to determine if the workarounds could increase the possibility of an initiating event, if the workaround was contrary to training, required a change from long standing operational practices, created the potential for inappropriate compensatory actions, impaired access to equipment, or required equipment uses for which the equipment was not designed.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed four post-maintenance testing activities. As part of this inspection, the documents in the Attachment were used to evaluate the potential for an inspection finding. The inspectors verified that the post-maintenance test procedures and activities were adequate to ensure system operability and functional capability. Activities were selected based upon the structure, system, or component's ability to impact risk. The inspection activities included, but were not limited to, witnessing or reviewing the integration of testing activities, applicability of acceptance criteria, test equipment calibration and control, procedural use and compliance, control of temporary modifications or jumpers required for test performance, documentation and evaluation of test data, and system restoration. Also, the inspectors verified that maintenance and post-maintenance testing activities adequately ensured that the equipment met the licensing basis, Technical Specifications (TS), and UFSAR design requirements.

The inspectors selected the following post-maintenance activities for review for a total of four samples:

- CWO A58852, "Replace pressure switch (PS) 4544 Low Low Set (LLS) logic A pressure," during the week of October 25, 2003;
- CWO A60151, "Need to replace galled threads on Pressure Differential Switch (PDS) 4305-V80," during the week of November 1, 2003;
- CWO A64792, "Troubleshoot/Repair Position Switches and Operator for Control Valve (CV) 4327C," during the week of November 8, 2003; and
- CWO A63709, "SRM 'C' is Behaving Erratically at Full Rated Power," during the week of November 8, 2003.

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

1. Forced Outage for Condenser Tube Leak

a. Inspection Scope

The inspectors observed shutdown activities for the forced outage on November 2, 2003, to investigate a condenser tube leak. The inspectors monitored the licensee's cooldown process and ensured that TS were followed during the transition into Modes three and four. The licensee, as part of the 4-day outage, fixed the condenser tube leak in the "F" Water Box. Additionally, the licensee replaced the "C" Source Range Monitor. The inspectors monitored outage configuration management on a daily basis by verifying that the licensee maintained appropriate defense in depth to address all shutdown safety functions and satisfy TS requirements. Proper operation of the decay heat removal system was reviewed during multiple reactor building and control room tours and observations. The licensee restarted the reactor on November 6, 2003.

As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding.

b. Findings

No findings of significance were identified.

2. Forced Outage for High Reactor Conductivity

a. Inspection Scope

The inspectors observed shutdown activities for the forced outage, to investigate high reactor conductivity, which began on November 7, 2003. The inspectors monitored the licensee's cooldown process and ensured that TS were followed during the transition into Modes three and four. The inspectors monitored outage configuration management on a daily basis by verifying that the licensee maintained appropriate defense in depth to address all shutdown safety functions and satisfy TS requirements.
Proper operation of the decay heat removal system was reviewed during multiple reactor building and control room tours and observations. The licensee restarted the reactor on November 8, 2003. As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding.

b. Findings

No findings of significance were identified.

3. Forced Outage for High Condenser Air In-leakage

a. Inspection Scope

The inspectors observed shutdown activities for the forced outage, to investigate high condenser air in-leakage, which began during the startup on November 9, 2003. The inspectors monitored the licensee's cooldown process and ensured that TS were followed during the transition into Modes three and four. The inspectors monitored outage configuration management on a daily basis by verifying that the licensee maintained appropriate defense in depth to address all shutdown safety functions and satisfy TS requirements. Proper operation of the decay heat removal system was reviewed during multiple reactor building and control room tours and observations. As part of this inspection, the documents in the Attachment were used to evaluate the potential for an inspection finding. On November 25, 2003, the plant was restarted after the condenser boot replacements.

b. Findings

No findings of significance were identified.

4. Forced Outage for Condenser Weld Repair

a. Inspection Scope

On November 25, 2003, the plant was manually scrammed due to a sudden unexpected decrease in condenser vacuum. After extensive troubleshooting over a four day period, plant staff determined the cause was a faulty weld on the high pressure side of the inter-condenser water seal. This weld was repaired, as well a preventive weld repair on the condenser low pressure side. Plant staff conducted extensive visual inspections of all other condenser welds and found no other problems. The inspectors monitored outage configuration management on a daily basis by verifying that the licensee maintained appropriate defense in depth to address all shutdown safety functions and satisfy TS requirements. Proper operation of the decay heat removal system was reviewed during multiple control room tours and observations. As part of this inspection, the documents in the Attachment were used to evaluate the potential for an inspection finding. The licensee restarted the reactor on December 5, 2003.

b. Findings

No findings of significance were identified.

IR22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors selected the following surveillance test activities for review. Activities were selected based upon risk significance and the potential risk impact from an unidentified deficiency or performance degradation that a system, structure, or component could impose on the unit if the condition were left unresolved.
As part of this inspection, the documents in the Attachment were used to evaluate the potential for an inspection finding.

The inspectors selected the following surveillance activities for review for a total of five samples:

- Surveillance Test Procedure (STP) 3.5.1-07; "HPCI System Simulated Automatic Actuation;" during the week of October 11, 2003;
- STP 3.6.1.6-01; "Pressure Suppression to Reactor Building Vacuum Breaker Operability Test;" during the week of November 1, 2003;
- STP 3.3.5.1-22; "Recirculation Riser D/P A/B Instrument Calibration;" during the week of November 1, 2003;
- STP 3.10.4-01; "Single Control Rod Withdrawal;" during the week of November 8, 2003; and
- Special Test Procedure 205, "Pump House Ventilation with Closed Damper," Rev. 0, during the week of November 15, 2003.

b. Findings

No findings of significance were identified.

1EP2 Alert and Notification System (ANS) Testing (71114.02)

a. Inspection Scope

The inspectors discussed with Emergency Preparedness (EP) staff the design, equipment, and periodic testing of the public ANS for the Duane Arnold Energy Center (DAEC) emergency planning zone to verify that the system was properly tested and maintained. The inspectors also reviewed procedures and records for a 24 month period ending September 2003 related to ANS testing, annual preventive maintenance, and non-scheduled maintenance. The inspectors reviewed the licensee's documentation for determining whether each model of siren installed in the emergency planning zone would perform as expected if fully activated. Records used to document and trend component failures for each model of installed siren were also reviewed to ensure that corrective actions were taken for test failures or system anomalies. Additionally, the inspectors discussed the results of DAEC assuming full responsibility for maintenance of all sirens and associated equipment. The inspectors examined documentation submitted to the Nuclear Regulatory Commission (NRC) and Federal Emergency Management Agency (FEMA), and the state of Iowa relating to this change concerning the station's Alert and Notification System.

b. Findings

No findings of significance were identified.

1EP3 Emergency Response Organization (ERO) Augmentation Testing (71114.03)

a. Inspection Scope

The inspectors reviewed and discussed with EP staff the procedures which provided guidance for staffing of the current ERO rosters at DAEC station. The inspectors assessed the primary and backup provisions for notification of the DAEC emergency responders. The inspectors also reviewed the licensee's assessment of its vendor's automated call-out system's processes and administrative controls. The inspectors examined the station's procedures for conducting monthly, off-hours, and unannounced ERO augmentation drills. The inspectors reviewed the results of the licensee's ERO augmentation testing to verify that the licensee maintained, tested, and critiqued its capability to staff the ERO. Specifically, the inspectors reviewed off-hours, unannounced staff augmentation test procedures, dated May 6, 2003, June 28, 2003, and September 9, 2003. Additionally, the inspectors reviewed the results of the October 2002 NRC/FEMA exercise, the September 17, 2003 White Team Dress Rehearsal, and the October 24, 2003 White Team Evaluated Exercise. The inspectors assessed the adequacy of licensee's drill critiques and the entry of deficiencies into the corrective action program. The inspectors reviewed these documents to assess the licensee's ability to identify repetitive problems, contributing causes, and the extent of conditions, and then implement corrective actions in order to achieve lasting results. The

inspectors reviewed the 2001 - 2003 revisions to the station's ERO team rosters to verify that an adequate number of station staff were maintained for each key and support position. The inspectors also examined a representative sampling of station ERO members' training records to verify that those key and support personnel, who were listed on the current revision of the Station's call-out roster, had completed all annual EP training requirements.

b. Findings

No findings of significance were identified.

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

Between July and early December, 2003, the NRC received seven submittals of revisions to portions of either the licensee's Emergency Plan or the Emergency Action Levels (EAL) Technical Bases document. The inspector reviewed the following revisions of the Plan to determine if changes identified in these revisions reduced the Plan's effectiveness, pending on-site inspection of the implementation of these changes: Section B, Revisions 24 and 25; Section D, Revision 22; Section F, Revision 22; Section H, Revision 23; Section J, Revision 21; and Appendix 6, Revision 22. The inspector also reviewed the following revisions to sections of the EAL Technical Bases document to determine if changes identified in these revisions reduced the effectiveness of the licensee's emergency classification scheme, pending on-site inspection of the implementation of these changes: Section EBD-DEF, Revisions 2 and 3; Organization Section, Revision 3; Section EBD-A, Revision 7; Section EBD-E, Revision 0; Section EBD-F, Revision 4; Section EBD-H, Revisions 5, 6, 6A, and 7; and Section EBD-S, Revision 5.

b. Findings

No findings of significance were identified.

1EP5 Correction of Emergency Preparedness Weaknesses and Deficiencies (71114.05)

a. Inspection Scope

The inspectors reviewed a sample of Nuclear Oversight staff's 2002 and 2003 audits of the station's EP program to verify that these independent assessments complied with the requirements of 10 CFR 50.54(t). The inspectors also reviewed the EP staff's 2002 and 2003 self-assessments and critiques to evaluate the EP staff's efforts to identify and correct weaknesses and deficiencies. The inspectors examined corrective action documents (i.e., Action Requests [AR], Apparent Cause Evaluations [ACE], and Root Cause Evaluations [RCE]) that were associated with the October 2002 biennial exercise, several EP drills conducted during the remainder of 2002 and into 2003, as well as for other issues relating to the licensee's EP program, in order to verify that the licensee had fulfilled its drill commitments and to evaluate the licensee's efforts to identify, track,

and resolve concerns identified during these activities. Additionally, the inspectors assessed a sample of EP procedures to verify that they were revised as indicated by relevant corrective action program records.

b. Findings

No findings of significance were identified.

## 4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

**Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness**

.1 Reactor Safety Strategic Area

a. Inspection Scope

The inspectors sampled licensee submittals for the performance indicators (PIs) listed below for the period of January, 2002 to September, 2003. To verify the accuracy of the PI data reported during that period, PI definitions and guidance contained in the applicable revision of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline" were used. The following five PIs were reviewed:

- Safety System Functional Failures, during the week of October 25, 2003;
- RHR Unavailability, during the week of December 13, 2003;
- Alert and Notification System (ANS), during the week of November 1, 2003;
- Emergency Response Organization (ERO) Drill Participation, during the week of November 1, 2003; and
- Drill and Exercise Performed (DEP), during the week of November 1, 2003.

In addition, the inspectors reviewed Licensee Event Reports (LERs), licensee memoranda, plant logs, and other documents to determine whether the licensee adequately identified the reported data. Records of relevant Action Requests (AR), ACE, Control Room Simulator training sessions, periodic ANS tests, and excerpts of drill and exercise scenarios and evaluations were also reviewed. As part of this inspection, the documents in the Attachment were utilized to evaluate the potential for an inspection finding

b. Findings

No findings of significance were identified.

## 4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action system at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Minor issues entered into the licensee's corrective action system as a result of the inspectors' observations are generally denoted in the report.

b. Findings

No findings of significance were identified

.2 Control Building Chiller Problems

Introduction

As part of the plant status and maintenance effectiveness inspections the inspectors verified that the licensee had entered identified problems into their corrective action program. During these activities, the inspectors identified several CAPs which were equipment problems that were indicative of an adverse equipment performance trend for both the 'A' and 'B' Control Building Chillers'. Also, during 2003 several unplanned LCO's were entered due to problems with the 'A' chiller, especially the compressor and 3-way valve controller. Because of the number of issues identified, the inspectors selected licensee corrective actions related to Control Building Chiller problems for periodic review of the problem identification and resolution program per NRC Inspection Procedure (IP) 71152. Additionally, the inspectors verified that the issues were correctly entered and addressed for resolution in the licensee's corrective action program.

The inspectors questioned licensee staff and reviewed procedures and programs for trending and coping with Control Building Chiller failures. The following CAPs and those included in the Attachment were part of the inspectors' review:

- CAP 14515, "Unplanned LCO Entered for 'A' Chiller";
- CAP 19818, "Control Building Chiller Tripped on Low Oil Temperature"; and
- CAP 19714, "A CB Chiller 3-Way Valve Water Leak After Maintenance".

a. Effectiveness of Problem Identification

(1) Inspection Scope

The inspectors reviewed the above listed CAPs and those included in the Attachment. The inspectors' review included verification that problem identification was complete, accurate, and timely, and that the issue considered that the evaluations for extent of condition, generic implications, common causes, and previous occurrences were adequate.

(2) Issues

For each CAP reviewed, the licensee had identified the nature of the malfunction, and identified that the continued failures of the 'A' Control Building Chiller compressor and 3-way valve controller warranted a more extensive maintenance effort to preclude causing unnecessary LCO entries. As a result, the licensee developed comprehensive Level A plans to repair the compressor during the month of January, 2004 and to repair the 3-way valve controller during the month of February, 2004. Additionally, the licensee had also observed several failures of the 'B' Control Building Chiller to load properly, and as a result, plant staff placed this equipment on the priority list. Plant staff will develop a troubleshooting plan in early January, 2004 to investigate the causes for the 'B' Control Building Chiller to load properly. The inspectors will continue to review the progress of these efforts.

.3 Configuration Control Problems

Introduction

The inspectors identified CAPs related to deficiencies in configuration control with respect to maintaining correct electrical and valving alignments. Because of the number of issues identified, the inspectors selected licensee corrective actions related to configuration control for periodic review of the problem identification and resolution program per NRC Inspection Procedure (IP) 71152. Additionally, the inspectors verified that the licensee identified issues at an appropriate threshold, that these issues were correctly entered in the corrective action program, and that they were properly addressed for resolution.

The following CAPs and those included in the Attachment were part of the inspectors' review:

- CAP 029587, "LT4541 (RX Vessel Wide Range (Flood) Cable Routing Violates Divisional Separation," October 30, 2003;
- CAP 029948, "LIC4161A Found Programmed Differently Than Originally Programmed," November 26, 2003; and
- CAP 029938, "V07-134 & V07-139, Condensate Supply to Reactor Feed Pump Seals Found Closed," November 26, 2003.

a. Effectiveness of Problem Identification

(1) Inspection Scope

The inspectors reviewed the above listed CAP and multiple associated CAP for the period from January, 2002 to December, 2003. The inspectors' review included verification that problem identification was complete, accurate, and timely, and that the issue considered that the evaluations for extent of condition, generic implications, common causes, and previous occurrences were adequate.

(2) Issues

The inspectors observed that the licensee was effective in identifying configuration control problems, and in particular the licensee was aware of the human performance problems in that several of the CAPs listed above involved plant staff not following procedures or not conducting peer checks appropriate to the circumstances. This was highlighted in discussions with the Plant Manager, as several of the above listed problems occurred during the four forced outages in November, 2003. The inspectors ascertained during these discussions that proactive measures would be taken to preclude the occurrence of additional similar problems.

The inspectors also observed that in December, 2003 the licensee began implementing a program to better trend CAPs in order to improve human performance, since there is now a year's worth of data entered into the new CAP software database. In this trending program, the licensee's Performance Improvement Department will provide the various departments with information to help them identify and evaluate trends in their departments. When this is complete, the Performance Improvement Department will provide licensee management with quarterly site performance evaluations. The trending code data will include the following categories:

- human performance error type;
- human performance failure mode;
- organization/management failure mode; and
- the activity which was performed and process which was followed.

The inspectors will continue to review the progress of the new CAP trending program, in particular as it relates to configuration control problems.

.4 Routine Review of Identification and Resolution of Problem Related to Heat Sink Performance

a. Inspection Scope

From November 18, 2003 through November 21, 2003 in an on-site office in the plant support center, the inspectors reviewed the licensee corrective action program reports concerning heat exchanger and ultimate heat sink performance issues. Specifically, the inspectors focused on corrective actions implemented for; substantial silting deposits identified in the Cedar River at the intake structure, biofouling of the RHR service water strainers, and biological deposits (bryozoan colonies) identified in the intake pits and stilling water basin. The inspectors reviewed these corrective action program documents to confirm that the licensee had appropriately described the scope of the

problems. Additionally, the inspectors' review included confirmation that the licensee had an appropriate threshold for identifying issues and had implemented effective corrective actions. The inspectors performed these reviews to ensure compliance with 10 CFR Part 50 Appendix B, Criterion XVI, "Corrective Action," requirements.

b. Findings

No findings of significance were identified.

## 4OA5 Other Activities

.1 Review of Institute of Nuclear power Operations Report

The inspectors and branch chief completed a review of the interim report for the Institute of Nuclear Power Operations, August, 2003 Evaluation, dated October 28, 2003.

.2 (Closed) Unresolved Item (URI) 50-331/02-12-01: "Reassess the Accuracy of the Drill Exercise Performance (DEP) Indicator Records in Accordance with Revision 1 of NEI 99-02 Guidance and Resubmit Indicator Data as Needed"

The inspectors identified an issue regarding the licensee's assessment of numerous initial notification forms (designated NOTE 5 forms), which were associated with DEP Performance Indicator (PI) opportunities during Control Room Simulator (CRS) training sessions conducted from October, 2001 through June, 2002. The inspectors identified inaccuracies in the completed NOTE 5 forms that could have potentially impacted the licensee's previously submitted DEP PI data sufficiently to cause this PI to fall from the Licensee Response (Green) to the Regulatory Response (White) Band.
The licensee's evaluation of the forms may have been outside the criteria of NEI 99-02, Revision 1, "Regulatory Assessment Performance Indicator Guideline."

On October 22, 2002 during a review of PI data, the inspectors identified potential inaccuracies in the DEP PI data that had been submitted to the NRC. Of the records reviewed, the inspectors noted four types of questionable data reporting issues. The most frequent issue in question centered on designating the CRS training session as an "Actual" or "Drill" scenario.

The inspectors reviewed the licensee's follow-up actions to the URI notification. The licensee initiated a comprehensive internal audit of the entire Emergency Preparedness performance indicator program. A complete reevaluation of the DEP PI data (i.e., for the time period in question) was performed by the EP staff. The licensee initiated a DEP PI Improvement Plan which incorporated a review of human performance, follow-up or contingency plans for missed opportunities, and a revision of the EP program as it related to capturing, reviewing, scoring, and filing of DEP PI data. Additionally, the licensee revised the NOTE 5 forms and provided additional training to those station personnel (i.e., decision makers and key communicators) that fill out the NOTE 5 forms so that the likelihood of this issue reoccurring would be minimized. The revised DEP PI data that was submitted to the NRC was reviewed by the inspectors and found to be

accurate (i.e., the licensee's DEP performance indicator data had remained in the "Green" Licensee Response band).

The requirements of 10 CFR 50.9 state that information provided by the licensee to the NRC must be complete and accurate in all material respects. As performance indicators are an integral part of the NRC's assessment of licensee performance and the basis for certain regulatory decisions, submitting inaccurate performance indicator information is a violation of 10 CFR 50.9. Since the inaccurate information did not result in a change to the color of the performance indicator, it constituted a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the Enforcement Policy.

.3 (Closed) Unresolved Item (URI) 5000331/2003005-01: "LPCI Swing Bus Failure"

On September 25, 2003 while stroking motor-operated valve (MOV) 2004, which is the "A" RHR outboard injection valve, the control room received the annunciator for breaker 1B4402 being tripped. Breaker 1B4402 is the supply feeder breaker from division two power and by means of another in-line breaker, IB4401, provides power to the low pressure coolant injection (LPCI) swing bus, which supplies power to all of the RHR LPCI injection valves. The LPCI swing bus is equipped with power control logic that ensures that the bus has power from an operable diesel generator and it does this by the breaker interactions between 1B4401 and 1B3401. When either breaker 1B4401 or 1B3401 trips, the associated breaker automatically closes in to ensure power is maintained to the bus. The LPCI swing bus was being powered from division two power prior to the breaker trip. An electrical transient tripped breaker 1B4402, and since breaker 1B4401 did not trip, breaker 1B3401 did not close; therefore, power was lost to the LPCI swing bus. This resulted in the plant without automatic operation of the LPCI mode of either train of RHR since no power was available to the injection valves. The plant still had both divisions of core spray operable and available and the ability to manually operate the RHR injection valves to ensure that the safety function of low pressure injection was maintained.

The inspectors reviewed Apparent Cause Evaluation (ACE) 1280, "LPCI Swing Bus Failure," and noted that the problem was due apparently to pinched cabling from 1B3494 to Motor Operator (MO)-2004 at the top corner of the Motor Control Center (MCC), which, over several years of thermal expansion and contraction, led to a hole in the cable insulation approximately 4-5 millimeters long. When the valve was stroked, an arc from the cabling caused a single phase to ground fault near 1B3490. This in turn caused a three phase to ground fault on the wires to 1B3490.

With regard to the failure of 1B4402 to reset, the inspectors reviewed Condition Evaluation 1210, "Investigate Failure Mechanism of 1B4402." Plant staff had determined that the failure mechanism was due to the severity of the ground fault which caused this breaker to trip, and the resulting excess carbon and copper byproducts from the main contact ('C' phase) caused the resetting mechanism to become fouled. Normally the fouling materials and gases should have been vented through the arc chute. However, in this case, excessive breaker casing internal pressure occurred during the ground fault, causing gases and splattered metal to be directed into the bottom sections of the breaker, thereby fouling the reset mechanism.

The inspectors concluded that with regard to the initiating fault and subsequent breaker resetting, a performance deficiency did not exist. Plant staff did a thorough review of the apparent causes for these failures. The inspectors noted that the licensee took corrective actions to inspect "pinch-points" in other MCCs, and was evaluating the need to revise GMP-ELEC-18, "Electrical Panel Distribution," to incorporate additional guidance for inspecting cabling in the MCCs. With regard to replacement breakers, the inspectors noted that the licensee took steps to upgrade the LPCI swing bus breakers with an improved design, as well as procure replacements to have extra in-stock. The inspectors reviewed the results of STP 3.8.7-01, "LPCI Swing Bus A/C D/C Undervoltage Transfer Test," which was performed on December 12, 2003 and verified that this surveillance was completed satisfactorily. Furthermore, the inspectors reviewed the licensee PI submittal for the third quarter of 2003 to verify that the impact of the LPCI swing bus outage was adequately reflected in the PI data. URI 5000331/2003005-01 is considered closed.

## 4OA6 Meetings

.1 Exit Meeting

The inspectors presented the inspection results to Mr. J. Bjorseth and other members of licensee management at the conclusion of the inspection on January 6, 2004. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Interim Exit Meetings

Interim exits were conducted for:

- Emergency Preparedness inspection with Mr. R. Anderson on October 31, 2003;
- Heat Sink Performance with Mr. S. Huebsch on November 21, 2003;
- Emergency Preparedness inspection with Mr. P. Sullivan via telephone on December 10, 2003, via telephone; and
- Licensed Operator Requalification 71111.11B with Mr. A. Johnson on December 18, 2003 via telephone.

## 4OA7 Licensee-Identified Violations

The following violation of very low significance was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Manual, NUREG-1600, for being dispositioned as an NCV.

**Cornerstone: Mitigating Systems**

1. The licensee has committed to apply the requirements of 10 CFR 50, Appendix B, Criterion III, Design Control to the development and implementation of the Duane Arnold Fire Protection Program. 10 CFR 50, Appendix B, Criterion III requires, in part, that

measures shall be established to assure that applicable regulatory requirements and the design basis, and as specified in the license application, for those structures, systems, and components to which this Appendix applies are correctly translated into specifications, drawings, procedures, and instructions. Criterion III also requires, in part, that measures shall also be established for the selection... for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of SSCs. Contrary to these requirements, there were two separate examples that were considered collectively to be a single violation of 10 CFR 50, Appendix B, Criterion III, Design Control. These two example address the problems identified by the licensee during review of the fire-protection related functions of the RHRSW/ESW Pump Rooms' ventilation system. The first example identified by the licensee was the incorrect design schematic and subsequent installation of a temperature switch that was intended to provide for continued operation of the ventilation fan by maintaining the ventilation supply damper open. However, the design contained on the installation schematic did not ensure that the supply damper would fail open, as intended by the applicable fire protection design documents. This was considered to be an example of a violation for failure to assure that the fire protection design basis as specified in the license's fire protection plan was appropriately translated into the ventilation systems installation schematic. The second design issue identified by the licensee was associated with the fire damper between the 'A' and 'B' RHRSW/ESW Pump Rooms. This damper had an incorrect fusible link installed. The design called for a fusible link rated at 212 F, however, the installed fusible link was rated at 165 F. The was considered an example of a violation for failure to established appropriate measures to ensure that the fusible link selected was suitable for application. Collectively, both of these examples are considered to be a single violation of 10 CFR 50, Appendix B, Criterion III, Design Control. The licensee determined that despite the design problem with the temperature switch schematic and the installation of a fusible link rated at 165 instead of 212 F, the RHRSW/ESW Pump Rooms' ventilation would still work as required with regard its fire protection function. Therefore, this violation is of very low safety significance and is being treated as an NCV. The licensee initiated CAP 036461 to implement a modification to correct these design errors.

## SUPPLEMENTAL INFORMATION

## KEY POINTS OF CONTACT

Licensee
M. Peifer, Site Vice-President
J. Bjorseth, Plant Manager
R. Anderson, Business Support Manager
S. Catron, Regulatory Affairs Manager
D. Curtland, Engineering Director
T. Evans, Operations Manager
B. Kindred, Security Manager
C. Kress, Training Manager
W. Simmons, Maintenance Manager
D. Wheeler, Chemistry Manager
J. Windschill, Radiation Protection Manager

Nuclear Regulatory Commission
D. Beaulieau, Project Manager, NRR
B. Burgess, Chief, Reactor Projects Branch 2

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

| | | |
|---|---|---|
| 5000331/2003006-01 | NCV | Failure to Follow Maintenance Procedure for Returning TC7539A to service (Section 1R15) |

Closed

| | | |
|---|---|---|
| 5000331/2003006-01 | NCV | Failure to Follow Maintenance Procedure for Returning TC7539A to service (Section 1R15) |
| 5000331/2003005-01 | URI | Loss of the LPCI Swing Bus (Section 4OA5) |

Discussed

None

## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

1R01 Adverse Weather Protection

OI 537A2, Condensate/Demin Service Water System Valve Lineup, Revision 2
OI 710A1, Intake Structure HVAC System Electrical Lineup, Revision 2
OI 711A1, Pumphouse HVAC System Electrical Lineup, Revision 1
IPOI 6, Cold Weather Operations, Revision 28

1R04 Equipment Alignment

OI 151, Attachment 1, Core Spray System Electrical Lineup, Revision 2
OI 151, Attachment 4, B Core Spray System Valve Lineup, Revision 2
OI 151, Attachment 6, Core Spray System Control Panel Lineup, Revision 1
OI 410, River Water Supply System, Revision 39
OI 410A1, River Water Supply System Electrical Lineup, Revision 5
OI 410A2, 'A' River Water Supply System, Valve Lineup and Checklist, Revision 10
OI 454A4, 'B' ESW System Valve Lineup, Revision 4
OI 730A1, Control Building HVAC System Electrical Lineup, Revision 1
OI 730A2,Control Building Ventilation System Compressed Air System Valve Lineup, Revision 3
OI 730A4, Plant Chilled Water System Valve Lineup, Revision 2
OI 730A6, Control Building HVAC System Control Panel Lineup, Revision 3

1R05 Fire Protection

AFP-10, Reactor Building Main Exhaust Fan Room, Revision 22
AFP-11, Reactor Building Laydown Area, Revision 22
AFP-23, Control Building Battery Rooms, Revision 22
AFP-24, Control Building Essential Switchgear Rooms, Revision 24
AFP-24, Control Building Essential Switchgear Rooms,
AFP-74, Switchyard, Revision 1
AFP-79, Spent Fuel Storage Facility, Revision 0
AFP-3, HPCI, RCIC & Radwaste Tank Rooms, Revision 22
AFP-6, RHR Valve Room, Revision 22
AFP-12, Decay Tank and Condensate Phase Separator Rooms, Revision 22

1R07 Biennial Review of Heat Sink Performance

Work Order 1122379, RHR HX, January 24, 2003
Work Order 1119092, Clean Inspect RHR HX, April 2, 2003
Work Order 1119093, ET RHR HX, April 8, 2003
Work Order 1123206, UT HX Shell, March 22, 2003
Work Order 1093271, ET RHR HX, October 23, 1996
Work Order 1118453, 1G021/ENG, February 27, 2002

Work Order 1111147, 1G021/ENG, February 7, 2000
Performance Trend Report EDG 1E053B, January 1993 thru September 2002
Drawing 11905649, Heat Exchanger Assembly, Revision 2
Fairbanks-Morse Opposed Piston Engines 3800Td8-1/8, Pages Q1 thru Q5, Revision 30
Preplanned Task Z11428, Clean and Inspect RHR HX, October 3, 2002
Preplanned Task Z11578, EDG/1G021 Mechanical Inspection, January 3, 2002
GE-NE-A22-00100-23-01-R2, Project Task Report Duane Arnold Energy Center Asset Enhancement Task T0400: Containment System Response, Revision 2
Thermal Performance Analysis of RHR Heat Exchangers 1E201 A/B, February 12, 2003
Completed Test EMP-1E053-HT, Emergency Diesel Generator 1E-53A&B Coolers Heat Transfer Test, August 27, 2001
Completed Test EMP-1E053-HT, Emergency Diesel Generator 1E-53A&B Coolers Heat Transfer Test, July 23, 2002
Completed Test EMP 1P099-FV, Emergency Service Water Flow Verification Test, March 29, 2002
ACP 1208.4, GL 89-13 Heat Exchanger Performance & Trending, Revision 6
ACP 1208.5, Service Water Reliability Program, Revision 1
Heat Exchanger Thermal Performance and Trending Program, Equipment Monitoring Manual, Revision 6
Heat Exchanger Specification Sheet M015-146, Jacket Water Coolers, August 29, 1990
CAL-466-M-009, Thermal Performance Study For the Diesel Generator Coolers, Revision 1
Excellence Plan Action Item-River Water Management Plan
CAP029866, Calculation Supporting EMP-1E053-HT Not Verified, November 20, 2003
CAP029865, Potential Effect on Fouling of RHR HX Due to Post-LOCA Debris in the Torus, November 20, 2003
CAP029864, Design Control of Safety Related Heat Exchanger Plugging, November 20, 2003
CAP029863, B SGDG Jacket Cooling Water Heat Exchanger, November 20, 2003
CAP029862, 50.59 2002-002, RHR SW Strainer Bypass, November 20, 2003
CAP019394, Silt Levels In-Front Of Intake Structure, July 18, 2002
CAP011578, RHR SW Subsystem Availability with Degraded Strainer, September 5, 2001
CAP019425, Modify RHR Heat Exchanger Thermal Performance Testing, August 12, 2003
CAP019813, Additional Information Into Nature of Biofouling, November 15, 2002
CAP028856, Significant Amount of Bryozoans Found on Stilling Basin Floor, August 29, 2003
CAP026809, Focused Self Assessment of Heat Exchanger Program, April 8, 2003
CAP025348, Indicated Cedar River Flow Less Than 500 CFS, January 30, 2003
CAP025822, Review River Control Procedures, February 25, 2003
CAP027230, Intake Structure Silt/Sand Level Increased Over a Month, April 29, 2003
CAP027294, Sand Level In Front of Intake Structure Filled in Unexpectedly, May 6, 2003

CAP027979, 2 Inch thick Layer of Biological Growth on Walls of B Intake Pit, September 18, 2003

1R11 Licensed Operator Requalification Program

ESG 71, SRV Failure/Loss of Annunciators/ATWS, Revision 0
EOP, ATWS, Revision 12
EOP 1, Reactor Pressure Control, Revision 11
Integrated Plant Operating Instruction (IPOI) 3, "Power Operations," Revision 61
IPOI 4, "Shutdown," Revision 60
IPOI 5, "Reactor SCRAM," Revision 38
Emergency Action List (EAL) Table 1, Revision 2
ACP 110.1, Conduct of Operations, Revision 0
ACP 101.01, Procedure Use and Adherence, Revision 19
ACP 101.2, Verification Process and SELF/PEER Checking Practices, Revision 5

1R13 Maintenance Risk Assessments and Emergent Work Control

Work Planning Guide - 2, On-Line Risk Management Guideline, Revision 12
Online Look-Ahead Agenda, Week of October 4, 2003
CAP 029259, Missed Risk Analysis for "C" Torus to Drywell Vacuum Breaker," October 3, 2003 (NRC- identified issue)
CAP 029252, CV4327C failed to cycle during STP 3.6.1.7-01, October 3, 2003
CAP 029268, Risk Review needed for inoperable Torus-to-Drywell Vacuum Breaker, October 3, 2003
Online Look-Ahead Agenda, Week of October 18, 2003

1R14 Personnel Performance During Nonroutine Plant Evolutions and Events

Licensee Event Report (LER) 50-331/03-01, Manual Reactor Scram and Reactor Coolant Chemistry Excursion Due to Punctured Main Condenser Tube Caused by Failed Condenser Deflector Plate, March 27, 2003
LER 50-331/03-02, Inadequate Procedure Leads to Failure to Remove Key from Mode Switch when Locked in Refuel Position during Control Rod Movement as required by Technical Specifications, April 8, 2003
LER 50-331/03-03, Reactor Mode Change with a LCO in effect in Violation of Technical Specification 3.0.4, June 19, 2003
LER 50-331/03-04, Unplanned High Pressure Coolant Injection (HPCI) Limiting Condition for Operation (LCO) caused by HPCI Seal Water Line Crack and Class 2 Leakage, June 19, 2003
LER 50-331/S01-00, Unattended Safeguards Information Outside of the Protected Area caused by Personnel Error, May 15,2003

1R15 Operability Evaluations

OPR000246, Station Batteries 1D1, 1D2, 1D4, and 1D93, October 9, 2003
CAP027969, ESW room cooler inlet damper failed closed, June 25, 2003
CAP027974, TC7539A input tubing connection does not match prints, June 25, 2003
PWO 1123791, Calibrate TC7539A, May 6, 2003
CAP028922, Past Operability Review, September 4, 2003
OPR000247, KAMAN 1 & 2, October 21, 2003

CAP029571, Incorrect Calculations performed on STP NS791015, October 29, 2003 (NRC- identified issue)
CAP029311,Pump House HVAC Design Issues, October 7, 2003
CAP029587, Reactor Vessel Wide Range Transmitter Cable Routing Violates Divisional Separation, October 30, 2003
ACE 001207, TC7539A Input Tubing Does Not Match Prints, June 26, 2003
Special Test Procedure 205, Pump House Ventilation With Closed Damper, Revision 0, November 11, 2003
Engineering Calculation, Service Water Pump Room Heatup With Air Supply Damper Closed, November 20, 2003
Design Verification Summary Report, Calculation for CAP 027969, December 2003
CAP 036461, Implement a Modification to Correct the DCR-1207 Design Error, December 8, 2003
10 CFR 50.59 Screening Number 3208, SpTP Pump House Ventilation With Closed Damper, November 4, 2003
ACP 1408.27, Mechanical Connection Termination Sheet, Revision 0

1R16 Operator Workarounds

Operations Department Instructions 004, Identification, Tracking and Resolution of Equipment issues, Revision 8
Equipment Issues Assessment Factor, September, 2003
CAP 027105, Turning Gear Drive didn't engage, April 20, 2003
CAP 019119, "A" Control Building Chiller tripped, February 5, 2001
OTH 020484, Prepare Modification Package for Control Building Chiller, November 9, 2001
CAP 019106, Received Multiple Division 1 "125Vdc" system trouble alarms, September 6, 2000
OTH 020729, Track the implementation of modification for noise suppression, August 21, 2002
OTH 020981, Track Replacement of SV2436, October 25, 2002
CAP 019337, Cooling Water Supply Basket Strainer High Differential Pressure, June 10, 2002
OTH 020895, Evaluate Silt Removal following Refueling Outage18, October 14, 2002
CAP 025646, Control Rod 10-23 will not withdraw, February 16, 2003
CAP 025639, Mis-positioned Control Rod 10-39, February 15, 2003
CE 000368, Action Plan in Response to Smoke in the Control Room, February 18, 2003
CAP 025397, Source Range Monitors spiking, February 2, 2003

1R19 Post-Maintenance Testing

CWO A58852, Replace PS 4544 LLS logic A pressure, October 21, 2003
CWO A60151, Need to replace galled threads on PDS 4305-V80, October 27, 2003
CWO A64792, Troubleshoot/Repair Position Switches and Operator CV4327C, November 4, 2003
CWO A63709, SRM 'C' is Behaving Erratically at Full Power, November 4, 2003
MECFUN-G080-03, General Electric IRM/SRM Detectors, Revision 13

1R20 Refueling and Outage

Planned Outage Look Ahead Report, November 3, 2003
Planned Outage Risk Analysis, November 3, 2003

Integrated Plant Operating Instruction (IPOI) 1, Startup Checklist, Revision 90
IPOI 2, Startup, Revision 75
IPOI 3, Power Operations, Revision 61
IPOI 4, Shutdown, Revision 61
IPOI 5, Reactor SCRAM, Revision 39
IPOI 8, Outage and Refueling Operations, Revision 30
Operating Instruction 149, RHR System, Revision 81
Outage Management Guidelines, Outage Risk Management Guidelines, Revision 11
Apparent Cause Evaluation 1310, Reactor Water High Conductivity, November 8, 2003
CAP 29719, Manual Reactor Scram Due to Rising Water Conductivity, November 7, 2003
CAP 29727, Turbine did not trip on Reverse Power, November 7, 2003
Reactor Engineering Shutdown Plan for Condenser In-leakage Repair, November 13, 2003
Reactor Engineering Startup Plan following Condensate Demin Outage, November 7, 2003
Reactor Engineering Startup Plan following Condenser Tube Leak Outage, November 5, 2003
Equipment Monitoring Procedure 1E007A/B, Main Condenser Air In-leakage Test, Revision 0
High Conductivity Recovery Plan, Revision 0, November 7, 2003
Work Order A65670, Air In-leakage at the Northwest Corner of the Rubber Belt Expansion Joint, November 12, 2003
OI 692 Turbine Steam Seal System, Revision 19

1R22 Surveillance Testing

STP 3.5.1-07, HPCI System Simulated Automatic Actuation, Revision 9
STP 3.6.1.6-01, Pressure Suppression to Reactor Building Vacuum Breaker Operability Test, Revision 4
STP 3.3.5.1-22, Recirculation Riser D/P A>B Instrument Calibration, Revision 0
I.PDIS-I204-01, Barton Models 278, 288A, 289A Differential Pressure Indicating Switches, Revision 19
STP 3.10.4-01, Single Control Rod Withdrawal, Revision 3
WO 1126698, Calibrate TIC 7538A, November 12, 2003
WO 1125138, Inspect Instrument Snubbers for Plugging and Clean Internals if Required, September 22, 2003
Special Test Procedure 205, Pump House Ventilation with Closed Damper, Revision 0

1EP2 Alert and Notification System (ANS) Testing

EDPM 1013, Emergency Siren (ANS) and Siren Program, Revision 2
OTH025376, WMT. Primary Emergency Alert System (EAS) Provider for this Area, Is Not Staffed Constantly, July 26, 2002
Emergency Telephone Book, Manual Notification Process, Revision 0
Emergency Telephone Book, Manual ERO Call-out Process, Revision 0
Evacuation Time Estimate Study for the Duane Arnold Energy Center Emergency Planning Zone, June 19, 2003
An Off-site Emergency Plan Prompt Alert and Notification System Addendum for Duane Arnold Energy Center, Revision 4A, December, 1999
Graphic of Siren Coverage for Emergency Planning Zone

Justification for the Addition of Addendum"A" to the FEMA-43/REP-10 Report
Log Sheets for Duane Arnold Energy Center ANS, Monthly Operability Reports, CYs 2001 - 2003
Work Orders Listing for Work on DAEC ANS, from November 2001 to October 2003

1EP3 Emergency Response Organization (ERO) Augmentation Testing

EPDM 1009, Emergency Response Organization (ERO) Training and Qualification Program, Revision 4
EPDM 1016, ERO Augmentation Drill & Testing Program, Attachment 2, Augmentation Drill Report Form, Revision 1, Test Results from May 6, 2003
EPDM 1016, ERO Augmentation Drill & Testing Program, Attachment 2, Augmentation Drill Report Form, Revision 1, Test Results from June 28, 2003
EPDM 1016, ERO Augmentation Drill & Testing Program, Attachment 2, Augmentation Drill Report Form, Revision 1, Test Results from September 9, 2003
EPDM 1017, EP Staff Training & Qualification Program, Revision 0
EPIP 1.2, Emergency Plan Implementation Procedures, Notifications, Revision 29
EPIP 152, Emergency Plan Implementation Procedures, Activation and Operation of the EOF, Revision 5
EPIP 2.1, Emergency Plan Implementation Procedures, Activation and Operation of the Operational Support Center (OSC), Revision 14
EPIP 2.4, Emergency Plan Implementation Procedures, Control Room Emergency Response Operation, Revision 15
EPIP 3.3, Emergency Plan Implementation Procedures, Dose Assessment and Protective Action, Revision 20
EPQ-003, Qual Card: JPIC Manager, Revision 0
EPQ-041, Qual Card: TSC ENS Manager, Revision 0
EPQ-080, Qual Card: 10 CFR 50.54(q) Review, Revision 0
EPQ-081, Qual Card: EP Staff Training and Qualification, Revision 0
EPT-001, NMC, DAEC, Emergency Response Organization Instructor Guide, Emergency Response Organization Overview, Initial Indoctrination Training, Revision 0
EPT-003, NMC, DAEC, Emergency Response Organization Instructor Guide, Protective Action Recommendation, Revision 1
EPT-052, NMC, DAEC, Emergency Response Organization Instructor Guide, Position Specific Training - TSC Operations Supervisor, Revision 0
EPT-054, NMC, DAEC, Emergency Response Organization Instructor Guide, Position Specific Training - Security & Support Supervisor, Revision 0
EPT-072, NMC, DAEC, Emergency Response Organization Instructor Guide, Position Specific Training - I&C Supervisor, Revision 0
OTH027755, Evaluate Issuing Pager to all 30 & 60 Minute Responders, May 7, 2003
OTH027933, ERO Automated Phone Call-out System Replacement, May 22, 2003
OTH028083, Unsatisfactory Results From 5/6/03, ERO Augmentation Call-out Drill, May 30, 2003
OTH033487, ERO Offsite Agencies Weekly Test Incomplete, January 19, 2002

1EP4 Emergency Action Level and Emergency Plan Changes

Duane Arnold Energy Center Emergency Plan, Section B, Revisions 24 and 25, Section D, Revision 22, Section F, Revision 22, Section H, Revision 23, Section J, Revision 21, and Appendix 6, Revision 22
Emergency Action Level Technical Bases Document, Section EBD-DEF, Revisions 2

and 3, Organization Section, Revision 3, Section EBD-A, Revision 7, Section EBD-E, Revision 0, Section EBD-F, Revision 4, Section EBD-H, Revisions 5, 6, 6A, and 7, and Section EBD-S, Revision 5.

1EP5 Correction of Emergency Preparedness Weaknesses and Deficiencies

AR 33167, Review the Events That Led to a Potential Missed PAR Based Upon a Wind Shift, October 25, 2003
ACE001173, Failure to Initiate a "CAP" Following Failure of 5/6/03 Call-out Test
ACP 114.4, Corrective Action Program, Revision 13
ACP 114.5, Action Request System, Revision 37
A-221, Evaluated Exercise Issues- Dose Projection PAR91407 and Wind shift (1410), October 29, 2002
CA028302, Emergency Planning QA Records Improperly Stored, June 16, 2003
CA029087, Missed DEP-PI, Rad Release Not Identified During EP Drill Notification, September 18, 2003
CAP029505, Iowa Home Land Security Emergency Management (Hlsem) Failure to Respond to DAEC Emergency Response Drill "Call-Out", October 23, 2003
CE000915, Emergency Planning QA Records Improperly Stored, June 2, 2003
EPDM 1001, Emergency Planning Department Organization, Revision 0
EPDM 1003, Maintenance of Emergency Response Facilities and Emergency Equipment, Revision 3
EPDM 1008, Emergency Response Drill and Exercise Program, Revision 3
EPDM 1010, EP Department Performance Indicators (PIs), Revision 5
EPDM 1008, Emergency Response Drill and Exercise Program, Attachment 4, Drill/Exercise Report Executive Summary, October 22, 2003
EPDM 1008, Emergency Response Drill and Exercise Program, Attachment 4, Drill/Exercise Report Executive Summary, September 17, 2003
OTH025621, Evaluated Exercise Drill Issues: TSC, OSC, ORAA, ORAl, ODEF, October 25, 2002
NEP 2003-0026, EP Program Enhancements, Completion of Action Items Requiring Site "Focus on Five" Attention, July 22, 2003
RCE000217, Documents Not Maintained in Accordance with QA Program Requirements, May 14, 2002
RFT035878, Provide Training to County EOC Members of the Traffic/Evacuation Plans, October 20, 2003
Change Management Plan, Emergency Planning Program Enhancements, May 5, 2003
Change Management Plan for Implementation of NMC CP0065, Emergency Response Organization
DAEC Emergency Plan, Revision 20
DAEC Emergency Plan, Section B, Emergency Response Organization, Revision 24
DAEC Emergency Plan, Section E, Notification Methods and Procedures, Revision 20
DAEC Emergency Plan, Section H, Emergency Facilities Staffing, Activation and Equipment, Revision 23
DAEC Emergency Plan, Section N, Exercise and Drills, Revision 20
DAEC Emergency Plan, Section O, Radiological Emergency Response Training, Revision 20
Emergency Action Plan, Brochure for Visitors and Guests in East Central Iowa localities, Revision 12/02
Graphic of DAEC Security Emergency Planning Drill, July 30, 2003

Graphic of 2003 White Team Dress Rehearsal Results, September 19, 2003
Graphic of 2003 White Team Evaluated Exercise Results, October 24, 2003
Review of the EP Department, ICM Self-Assessment (Reference AR OTH 27479), April 25, 2003
2002-001-1-017, Nuclear Oversight Observation Report, March 31, 2002
2002-002-1-009, Nuclear Oversight Observation Report, May 30, 2002
2003-001-1-007, Nuclear Oversight Observation Report, March 31, 2003
2003-002-1-002, Nuclear Oversight Observation Report, April 18, 2003
2003-003-1-013, Nuclear Oversight Observation Report, September 30, 2003

4OA1 Performance Indicator Verification

NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 2
Memorandum, DAEC 3rd Quarter 2003 PI Summary, October 20, 2003
Memorandum, DAEC2nd Quarter 2003 PI Summary, July 20, 2003
Memorandum, DAEC 1st Quarter 2003 PI Summary, April 21, 2003
Memorandum, DAEC 4th Quarter 2002 PI Summary, January 21, 2003
Memorandum, DAEC 3rd Quarter 2002 PI Summary, October 21, 2002
ACP 1402.4, NRC Performance Indicators Collection and Reporting,Revision 3
CY 2001, Drill/Exercise Performance (Revised Data)
CY 2002, Drill/Exercise Performance (Revised Data)
CY 2002, Drill/Exercise Performance (Revised Data)
4th Quarter, CY 2002, ANS Reliability, Drill/Exercise Performance(Revised), and ERO Drill Participation Results (Revised)
1st Quarter, CY 2003, ANS Reliability, Drill/Exercise Performance, and ERO Drill Participation Results
2nd Quarter, CY 2003, ANS Reliability, Drill/Exercise Performance, and ERO Dril Participation Results
EPDM 1010, Attachment 6, DEP-PI (Revision 4), ANS PI (Sirens) (Revision 4), and ERO Participation PI (Revision 5), 3rd Quarter, Cy 2003 or Data Retrieval Worksheet, Revision 3
EPDM 1010, Attachment 2, DAEC Emergency Planning Department, Performance Indicator Data Retrieval Worksheet, Revision 3
NOTE-05, State & County Notification Form, Training for Implementation of Revision No. 6, Revision 6
OTH026144, Emergency Planning DEP PI Falls Below DAEC Admin. Threshold of 92 Percent, January 16, 2003
OTHO026538, Review all EP-PI Processes for Conformance, February 20, 2003
OTH 027400, Results of EP-PI Audit, April 11, 2003
EPDM 1010, Attachment 2, DEP-PI, LOR Training, Criteria for Acceptable DEP-PI Opportunities, Revision 5
Duane Arnold Energy Center, Drill/Exercise Performance Indicator (DEP-PI) Improvement Plan, March 12, 2003
Duane Arnold Energy Center USNRC Inspection Report 50-331/2002-12(DRS)
Results of January, 2003 EP Audit, All DEP PI Note 5 Forms, October 2001 to June 6, 2002

4OA2 Identification and Resolution of Problems

CAP 014515, Unplanned LCO Entered for 'A' Chiller, February 2, 2003
CAP 019714, 'A' CB Chiller 3-Way Valve Water Leak After Maintenance, March 8, 2003
CAP 019818, Control Building Chiller Tripped on Low Oil Temperature, April 29, 2003
CAP 029150, 'A' Chiller Freon Service Valve on Backseat Preventing Full Flow to 3-Way Valve, May 6, 2003
CAP 030124, 'A' Chiller Compressor Indicating Unusual Vibration Problems, September 9, 2003
CAP 028747, 'A' Chiller Load Control Valve Sometimes Prevents Chiller from Loading, August 23, 2003
CAP 028279, Control Building Chiller 'A' Failed to Respond Properly, June 17, 2003
CAP 029248, Control Building Chiller 'A' Failed to Respond Properly, November 4, 2003
CAP 027913, 3-Way Metrix Temperature Control Valve on 'B' Chiller Appears Sluggish, November 4, 2003
CAP 026921, 'A' Control Building Chiller Motor Failure, August 2, 2003
CAP 025851, 1VCH001B, 'B' Chiller, Discharge Pressure Swinging Low Out of Spec, July 9, 2003
CAP 029587, LT4541 (RX Vessel Wide Range (Flood) Cable Routing Violates Divisional Separation, October 30, 2003
CAP 029948, LIC4161A Found Programmed Differently Than Originally Programmed, November 26, 2003
CAP 029938, V07-134 & V07-139, Condensate Supply to Reactor Feed Pump Seals Found Closed, November 26, 2003
CAP 029946, V05-145 (OG Condenser 1E-223 Drain Line Isolation) Found Closed, November 26, 2003
CAP 029119, PCV8913 (H2/O2 Analyzer Inlet Pressure Control) Found Installed Incorrectly, September 22, 2003
CAP 029948, Emergency Light Found With Incorrect Wiring, October 4, 2003

4OA5 Other Activities

ACE 1280, LPCI Swing Bus Failure, September 28, 2003
CE 1206, MCC 1B34A Electrical Insulation Question, September 26, 2003
CE 1210, Investigate Failure Mechanism of 1B4402, September 27, 2003
CE 1212, LPCI Swing Bus 1B34A/1B34B De-Energized – Evaluate Impact on RHR KPIs, September 28, 2003
OTH 35615, Review GMP-ELEC-18 for Potential Improvements, September 27, 2003
OTH 035617, LPCI Swing Bus 1B34A/1B44A De-Energized, September 28, 2003
OBD 000219, Cable from 1B3494 to MO2004 is Degraded, September 26, 2003
STP 3.8.7-01, LPCI Swing Bus A/C D/C Undervoltage Transfer Test, Revision 3
GMP-ELEC-18, Electrical Panel Distribution, Revision 12
Interim Report for the Institute of Nuclear Power Operations, August 2003 Evaluation, October 28, 2003.

## LIST OF ACRONYMS USED

| | |
|---|---|
| ACE | Apparent Cause Evaluation |
| ACP | Administrative Control Procedures |
| ADAMS | NRC's Document System |
| AFP | Area Fire Plan |
| ALARA | As Low As Reasonably Achievable |
| ANS | Alert and Notification System |
| AOP | Abnormal Operating Procedures |
| AOT | Allowable Outage Time |
| ATWS | Anticipated Transient Without a SCRAM |
| AR | Action Request |
| ARM | Area Radiation Monitor |
| BI | Baseline Inspection |
| CA | Corrective Action |
| CAP | Corrective Action Plan |
| CE | Condition Evaluation |
| CRD | Control Rod Drive |
| CFR | Code of Federal Regulations |
| CS | Core Spray |
| CST | Condensate Storage Tank |
| CV | Control Valve |
| CWO | Corrective Work Order |
| CY | Calender Year |
| DAEC | Duane Arnold Energy Center |
| DEP | Drill and Exercise Performed |
| DRP | Division of Reactor Projects |
| DRS | Division of Reactor Safety |
| EAL | Emergency Action Level |
| EP | Emergency Preparedness |
| ERO | Emegency Response Organization |
| ESG | Evaluated Scenario Guide |
| ESW | Emergency Service Water |
| F | Fahrenheit |
| FEMA | Federal Emergency Management Agency |
| FSAR | Final Safety Analysis Report |
| GL | Generic Letter |
| HIC | High Integrity Container |
| HPCI | High Pressure Coolant Injection |
| HRA | High Radiation Area |
| HSAS | Homeland Security Advisory System |
| HVAC | Heating Ventilation and Air Conditioning |
| IMC | Inspection Manual Chapter |
| IPOI | Integrated Plant Operating Instruction |
| JPM | Job Performance Measure |
| LER | Licensee Event Report |
| LCO | Limited Condition Of Operation |
| LLS | Low Low Set |
| LOCA | Loss Of Coolant Accident |
| LPCI | Low Pressure Coolant Injection |

| | |
|---|---|
| MOV | Motor Operated Valve |
| NCV | Non-Cited Violation |
| NFPA | National Fire Protection Association |
| DO | Damper Operator |
| NRC | Nuclear Regulatory Commission |
| OI | Operating Instruction |
| OWA | Operator Work Arounds |
| PARS | Public Availability Records |
| PDS | Pressure Differential Switch |
| PI | Performance Indicator |
| PWO | Preventive Work Order |
| PS | Pressure Switch |
| RCA | Radiologically Controlled Area |
| RCE | Root Cause Evaluations |
| RCIC | Reactor Core Isolation Cooling |
| RHR | Residual Heat Removal |
| RHRSW | Residual Heat Removal Service Water |
| RIS | Regulatory Information Summary |
| ROP | Reactor Oversight Process |
| RP | Radiation Protection |
| RPS | Reactor Protection System |
| RWP | Radiation Work Permit |
| SDC | Shutdown Cooling |
| SDP | Significance Determination Process |
| SE | Safety Evaluation |
| SER | Safeguard Event Report |
| SGI | Safeguards Information |
| SRV | Safety Relief Valve |
| SSCs | Structure, System, or Components |
| STP | Surveillance Test Procedure |
| TEDE | Total Effective Dose Equivalent |
| TMOD | Temporary Modification |
| TMP | Temporary Modification Permit |
| TS | Technical Specification |
| UFSAR | Updated Final Safety Analysis Report |